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False twist crimping machine.

1. False twist crimping machine for false twist crimping a plurality of thermoplastic yarns, each in one processing station, which comprises a feed yarn package, a first feed system, an elongate first heater, an elongate cooling plate, a false twist unit, a second feed system, as well as a takeup device, the false twist machine being composed of several frame parts, and a creel frame being associated with the false twist machine, characterized in that the frame parts comprise a processing frame provided in the direct vicinity of creel and a takeup frame facing away from the creel, that between the processing frame and the takeup frame, an operator aisle is formed, that the first feed system and the first heater are supported on the takeup frame, that the cooling plate, the false twist unit, and the second feed system are supported on the processing frame, and that

the takeup devices for a plurality of processing stations are arranged in columns on top of one another and can be serviced both from operator aisle and from the side facing away therefrom (service aisle).

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This invention relates to a false twist crimping machine as defined in the preamble of claim 1.

This type of false twist crimping machine is known from DE-PS 25 30 125.

The design of the false twist machine as shown therein is commonly used today. Along with the automation of the package doff, it is intended to construct the takeup device of the false twist crimping machine for operation on both sides. This is known from DE-A 41 49 045.

It is therefore the object of this invention to construct a false twist crimping machine such that the takeup devices can be operated on both sides, without obstructing the handling of the yarn, which may be still done by operators as in the past, by employing robots, which are responsible for the service of the takeup device, in particular the removal of full yarn packages and/or the supply of empty tubes, and it is intended to provide for several machines arranged side by side common aisles for furnishing feed yarn packages to the creels or for removing the textured yarn packages.

The realization of this object is described in claim 1.

This realization is directed to a machine, which can easily be enlarged to a double machine. To this end, the same machine is arranged in mirror symmetry to a vertical plane, which extends along the takeup frame in the service aisle designated for the removal of the packages, and which is adequately spaced apart from the takeup frame, so as to permit the passage and possibly the operation of a doffer. A further advantage of this arrangement, as claimed in claim 1, is that it permits different yarn paths or threadlines without changing the basic structure of the machine or double machine, these threadlines enabling a space-saving positioning of the machine components.

The false twist crimping machine permits to manually thread each yarn, which advances freely, in the feed systems and other treatment devices. Advantageous, however, is to guide each yarn from the creel through its own tube to the first feed system associated therewith. On the one hand, these tubes serve to protect the yarn. However, they also permit to thread the yarn by means of a suction gun. It is easy to guide the yarn through the machine by holding the suction gun against the end of the tubular passageway or yarn guide tube located at the first feed system and the yarn against the other end, which is located in the creel as closely as possible to the feed yarn package. This allows to also avoid that the operator or even the yarn comes into contact with machine components when threading the yarn.

A further advantage of the machine setup is that the threading operation becomes independent of the removal of the full yarn package. This advantage

results from the fact that an aisle extends on both sides of the takeup frame. From the one aisle extending between the processing frame and the takeup frame, the yarn is threaded to the takeup devices, and the respective empty tubes are supplied to the takeup device. From the other side of the takeup device, the full packages are removed (claim 11). In this manner, it is accomplished that the operation is not obstructed by the transportation of the packages. This further allows to automate the package transportation in a manner independent of the operation. On the other hand, the yarn path is selected such that the operator is able to overview the entire yarn path in all feed systems and treatment devices.

An advantage of the arrangements as shown in the Figures is that the operator aisle 4 is free for only the operation by a human being, with the individual operating elements being each located on the operating surface, i.e., when viewed in the direction of operation, none of the operating elements are successively arranged, which would considerably affect the operability. Particularly important for the good operability is that the yarn path is free and open.

In this arrangement, the threadline advancing from the creel crosses the yarn path in the false twisting zone. This allows the operator to observe and handle also the yarn advancing to the first feed system essentially up to its feed package. Consequently, this yarn path does not absolutely require a tubular passageway (claim 4). When a tubular passageway is useful, without however adversely affecting the accessibility and overview of the machine, the threadline as defined in claims 5 and 6 will be advantageous.

Primarily when processing fine yarns having a low denier, it is necessary to endeavor that the first feed system exert the lowest possible tensile forces. For this reason, it is necessary that in many applications too great deflections be avoided. The threadline as defined in claim 8 offers this advantage. Its characteristic consists in that the creels of the one machine half are used to store the feed packages for the yarns which are processed on the other machine half. When in this embodiment the tubular passageways or yarn guide tubes extend substantially along the horizontal plane of the first feed system, or a plane extending obliquely downward to the feed system, essentially only one deflection of 90° will result between the feed yarn package and the first feed system. It is here possible to have the yarn enter directly into the first feed system (claim 10).

However, when the first feed system is located such as not to be, or to be not substantially above the head of the operator, the tubular passageway of this arrangement will hinder the operator. In par-

ticular, it will obstruct the view to the heater and the cooling plate, possibly even to the false twist unit. In such an instance, the embodiment of claim 9 will remedy the situation, in that between the creel and the first feed system, the yarn is guided above the thermal treatment zone.

In the following, embodiments of the invention are described. In the drawing:

Figures 1 and 1A are schematic views of false twist crimping machine;

Figure 2-5, 7, and 8 illustrate double machines having the same setup with different threadlines;

Figure 6 is a top view of the false twist crimping machine with threadlines in accordance with Figures 4, 5, and 7;

False twist crimping machines as shown in Figures 2-5, 7, and 8 comprise two machine halves which are constructed in entirely the same manner as the machine of Figure 1. A separate description is therefore not necessary.

The following description applies to the false crimping machine shown in all Figures. Special characteristics in each embodiment of Figures 2-5, 7, 8 will be described with express reference thereto. The false twist crimping machine comprises a creel frame 1 (hereafter also referred to as creel), a processing frame 2, and a takeup frame 3. The creel 1 is set up closely adjacent to, in the illustrated embodiment back to back with the processing frame.

In its longitudinal direction -- in the Figures, the plane of the drawing corresponds to the transverse plane -- the false twist crimping machine is provided with a plurality of processing stations for one yarn each per processing station. The takeup devices occupy a width of three processing stations. Consequently, as will be described below in more detail, three takeup devices each are arranged, one on top of the other, so as to form a column.

Each operating station comprises a feed yarn package 10, on which a thermoplastic yarn 12 is wound. The yarn 12 is withdrawn overhead via a yarn guide 14 and deflection roll 26 under a certain tension by a first feed system 18. In the embodiment of Figures 1 and 2, the yarn advances between creel 1 and first feed system 18 without a tubular passageway. It is however possible to use tubular passageways also in this instance. In the absence of tubular passageways, it is possible to also arrange on processing frame 2, for example, yarn cutters, which sever the yarn, when breakdowns occur in the course of the process between first feed system 18 and the takeup. However, it is also possible to arrange the yarn cutter on the takeup frame directly upstream of first feed system 18.

With regard to a tubular passageway, the following description applies to all embodiments:

Already in creel 1, each yarn is fed into a tube. A plurality of tubes is combined to a bundle and arranged to extend along a plane above the respective creel 1 (Figures 1-4), or a plane in the central region of creel 1 (note Figures 5, 7), or a plane in the proximity of the floor (Figure 8). The bundle of tubes then proceeds along a threadline, which will be described in more detail with reference to Figures 2-8, from the creel to the respective first feed system 18. This arrangement makes it necessary to fan out the threadlines in the longitudinal direction of the machine. To this end, the bundle of tubes is separated in such a manner that the openings of the tubes extend in a horizontal line, namely, that each tube opening lies in front of one of the feed systems 18, which are arranged likewise in a horizontal line extending in the longitudinal direction of the machine, as can be noted, when referring to Figure 6.

In many instances, as is shown, for example, in Figure 4, the first feed system consists of a driven feed shaft 18.1 extending in the longitudinal direction of the machine. This feed shaft comprises a plurality of feed zones. In each feed zone, one yarn is advanced. To this end, the yarn is pressed against the feed shaft by means of an individual pressure roll 18.2 associated to each threadline. The pressure roll is adapted for radial movement for purposes of threading the yarn. It can be raised from the feed shaft, when a yarn is threaded. This means that the pressure roll must be arranged on the side of feed shaft 18.1, which faces the operator. Pressure roll 18.2 is not driven and, therefore, it is not suitable for use as a deflection roll. For this reason, it is necessary to associate a yarn guide 64 to feed system 18, as is shown in Figure 1A. This yarn guide deflects the yarn advancing from the creel into the nip between pressure roll 18.2 and feed shaft 18.1. As can be noted, this results in a yarn deflection of more than 180° between the creel and the nip of the feed system.

In direction of the advancing yarn, downstream of feed system 18, a first, elongate heater 20 is arranged, through which the yarn advances and, in so doing, is heated to a certain temperature. The heater 20 is followed by a further yarn guide 22, which deflects the yarn and advances it to a cooling plate 24. Heater 20 and cooling plate 24 may be arranged relative to another in the shape of a roof, with deflection 22 being arranged in the apex of the roof-shaped structure. Subjacent cooling plate 24 is a schematically illustrated false twist unit 28. This false twist unit 28 may be constructed in accordance with DE-PS 22 13 881 or U.S. Patent 4,339,915. Following false twist unit 28, an additional, second feed system 30 serves to pull yarn 12 both over heater 20 and cooling plate 24. For purposes of threading the yarn, a rod is used,

which extends in a straight line between the heater and cooling plate, an on the upper end of which deflection 22 is attached. To this extent, reference may be made to DE-PS 25 30 125.

In direction of the advancing yarn, downstream of second feed system 30, a set heater (second heater) is arranged, which is constructed as a curved heating tube 34 surrounded by a heating jacket 32. The heating jacket serves to heat heating tube 34 from the outside with vapor to a certain temperature. The heating tube 34 and its jacket are arranged upright.

In Figures 1, 2-5, and 8, an equalizing tube 42 connects to heating tube 34 in seamless, i.e. air-tight manner. This allows to accomplish that yarn 12 transports the atmosphere of heating tube 34 into equalizing tube 42. Arranged in the bend of a duct 38 is a yarn guide 44, which is constructed as a pin or roll with a peripheral groove. The pin or roll serves to advance yarn 12 with the slightest possible friction from heating tube 34 into equalizing tube 42. The heated air which is entrained by yarn 12 from set heater tube 34 into equalizing tube 42 results in that, despite the relatively low temperature, for example, about 160-180 °C, in set heater 34, the crimp imparted to yarn 12 in false twist zone 28 is further reduced than is possible with known set heaters.

Arranged at the outlet end of tube 42 is a further -- third -- feed system 46. Upstream or downstream thereof, a device not shown is located, which applies a spin finish (fluid) to yarn 12. The yarn is wound to a package 50 which is driven on its circumference by a friction roll 52. Arranged in front of friction roll 52 is a traversing mechanism 54, which reciprocates yarn 12 along package 50, so as to deposit it thereon in a cross wind.

In all false twist crimping machines, which are subject matter of this invention, it is possible to provide below the set heater in the place of equalizing tube 42, first, a further feed system 46 in the place of deflection 44, then an entanglement nozzle, and finally a feed system 65. This arrangement will allow to entangle the treated yarn under an adjustable yarn tension in the entanglement nozzle by directing air thereto, and to blend the filaments with one another. This method is useful in the treatment of a multifilament yarn for improving its winding properties. However, it is also possible to apply this method, so as to interlace and ply two yarns which have been produced on two different processing stations. With respect to the foregoing description, note Figure 1A. The additional feed system 65 and the entanglement nozzle, however, may also be omitted.

Located above equalizing tube 42 is a platform 56, which is supported by rails or posts 58 above floor 60, and serves as an operator aisle 4.

The operator aisle 4 is formed between processing frame 2 and takeup frame 3.

While creel frame 1 has been described already, processing frame 2 comprises, arranged from top to bottom, the following machine components:

Supported on the upper end of processing frame 2 is cooling plate 24. Arranged therebelow is false twist unit 28, and below same the second feed system 30. Subjacent second feed system 30 is set heater 32. Thus, the processing frame 2 is characterized in that it accommodates only such machine components which serve to treat the yarn.

Supported on takeup frame 3 in its upper region are the first feed system 18, as well as the first heater 20. Accommodated in its lower region is a spin finish applicator (not shown), as well as alternatively a deflection device, or the third feed system 46 (note Figures 1 and 2), or a fourth feed system 65 (Figure 1A).

It should be expressly stated that the third feed system may be arranged either at the bottom in processing frame 2, or however at the bottom in takeup frame 3. When the third feed system is located in processing frame 2 at the bottom, the equalizing tube 42 is omitted. In this instance, the deflection 44 is arranged in takeup frame 3 in the place of the illustrated feed system 46.

Moreover, takeup frame 3 serves only to accommodate the takeup and auxiliary devices. The latter include the following:

A package storage 6 serves to receive the full packages, which are removed from the respective takeup device, after a takeup device 7 has produced a full yarn package 50. To remove a full yarn package 50, the spindle carrier is rotated, and the full package is deposited on a rollway, which forms a part of package storage 6. On the rollway, the full yarn package 50 waits for its removal. For this reason, the rollway of package storage 6 is arranged on the side of takeup frame 3, which is adjacent to service aisle 5 and faces away from the operator aisle. The service aisle extends along takeup frame 3, and serves for the removal of the full packages waiting in storage 6. Furthermore associated to each takeup device 7 is a tube feed device 8, which is not described in more detail. It is a tube magazine, in which several tubes are temporarily stored. After a full yarn package has been produced on the spindle carrier of a takeup device 7 and deposited on the package storage, an empty tube is fed to the spindle carrier and secured thereon, as is disclosed in detail, for example, in DE-A 41 40 041.

It should here be expressly stated, that Figures 2-5, 7, and 8 illustrate double machines. It is easily possible to combine the frame parts, namely, creel frame 1, processing frame 2, and takeup frame 3 to

a one-sided machine, as is shown in Figures 1 and 1A for the threadline of Figure 2. In each instance, it applies that double machines are formed in that two identical machines are arranged in mirror-symmetry to a mirror plane 9, which extends at a distance from the service side of takeup frame 3, i.e., in front of package storage 6, thereby creating in the double machine an adequately wide service aisle 5 between the two takeup frames 3.

On the other hand, even the handling of the full packages and the empty tubes out of service aisle 5 remains unobstructed by the handling of the yarn. The handling of the yarn proceeds from operator aisle 4. The handling of the packages and the handling of the yarn can therefore occur independently of one another. As a result, this machine setup is particularly suitable for automating the handling of packages including the feed of tubes. It should however be emphasized that considerable advantages for the handling of the packages by a human being also result from this setup as a result of keeping the yarn handling independent of the package handling.

The handling of the packages is facilitated in that each takeup device is associated with a package storage. Such a package storage 6 consists of a rollway, which extends perpendicularly to the vertical longitudinal plane of the machine, and which is somewhat inclined and provided with a stop at its end. Each full package is deposited on this rollway. The full package waits then for an operator or a storage device, which picks up the full package. The takeup device itself is ready for winding a new package, as soon as the full package is deposited on the rollway. Suitable storage devices are shown, for example, in DE-OS 41 40 041 and DE-OS 43 01 051.

The special advantage of the false twist crimping machine consists in that the creel for the feed yarn packages on the one hand and the package storage of the takeup are arranged on opposite sides of the machine. Therefore, when two identical machines are arranged lengthwise side by side, the full packages will face one another in the service aisle 5 formed therebetween and the feed yarn packages in the next service aisle. The service aisles between several, lengthwise juxtaposed machines alternate in serving exclusively for the removal of the full packages and the supply of empty tubes, and on the other hand exclusively for the supply of feed yarn packages and the removal of unwound, empty tubes. This distinct separation allows to simplify the flow of materials significantly.

It should be remarked at this point that it is also possible to arrange creel frame 1 on a different floor, preferably above the floor, on which the remaining frame portions are installed. In this instance, it is recommended to use a tubular pas-

sageway, which corresponds, when modified accordingly, to tubular passageway 26 of Figures 3-5, 7, and 8. The arrangement of different floors allows to still further reduce the width of the false twist crimping machines, be it constructed as a single machine, or as a double machine, when creel frame 1 is fully or in part arranged vertically above processing frame 2, and/or takeup frame 3, and/or operator aisle 4, and/or service aisle 5.

The following description applies to the embodiments of Figures 1-8:

Referring to Figures 1, 1A, and 2, the frame portions, namely creel 1, processing frame 2, and takeup frame 3, are arranged such, and the yarn is guided such that it describes a path in the shape of the figure nine between deflection roll 16, i.e. between the creel and the takeup device. This means that the yarns advancing from creel 1 with deflection 16, are guided first in a horizontal or inclined plane through the processing frame (or thereabove) right to the takeup frame. During their passage in this plane they are fanned out such that each yarn is advanced to one of the feed systems 18 which are arranged one after the other in the longitudinal direction. Then, each yarn is returned in a loop, which is upward directed and encompasses the thermal treatment zone with first heater 20 and cooling plate 24, to the processing frame, and intersects here the threadline plane of the group of yarns advancing from creel 1. Each yarn is then guided vertically downward through false twist unit 28, second feed system 30, and set heater 34. There, the threadline describes a curve between deflection 44 and the third feed system 46 (or vice versa, the third feed system and a deflection), so as to cross below operator aisle 4 and advance upward to takeup frame 3, where the yarn is wound.

Referring to Figure 3, the frame portions, namely creel 1, processing frame 2, and takeup frame 3, are arranged such, and the yarn is guided such that it advances between the creel and first feed system 18 above heater 20 and cooling plate 24 without contacting same.

To this end, a bundle of tubes 26 is used, in which all yarns of the processing stations advance to be wound on three superposed takeup devices 7. The individual tubes of this bundle of tubes possess an upward directed, a horizontal, and a downward directed branch. The tubes are airtight, so that the yarns can be sucked off and sucked in by means of a suction gun, which is held against the individual tube in the region of first feed system 18. This tubular passageway has the advantage that it does not obstruct the operation of heater 20 and cooling plate 24 and the threading of the yarn. On the other hand, the bundle of tubes is simple to operate in that it permits to suck in the yarn. The

tubes possess the gentlest possible deflections, so as to permit the yarn to advance without being damaged, and so that air is prevented from accumulating.

In the embodiment of Figure 3, the yarn is deflected at bends **65** and **66** respectively by 90°, namely at bend **66**, so as to advance from the vertical to the horizontal, and at bend **65**, so as to advance from the horizontal to the vertical. The yarn can then advance however directly to feed shaft **18.1**. Pressure roll **18.2** is freely accessible to the operator, and can easily be moved in radial direction. In particular, it is not necessary or desirable to provide an additional yarn deflection as in the embodiment of Figures 1 and 1A.

It should however be expressly indicated that it is also possible to use the embodiment of Figure 1, in which the yarn advances directly to first feed system **18**, when the feed shaft is arranged such that it faces the operator. In this instance, there results only a certain complication in the operation of the pressure roll, which may however be made up for by a corresponding construction of the pressure roll.

In the embodiments of Figures 1-3, it is necessary to fan out the threadlines above the operator aisle in a horizontal plane in such a manner that their threadlines previously bundled in the creel separate, and one yarn each advances to one of the feed systems **18** or the feed zones of the feed shaft. The embodiment of Figure 3 also permits to fan out the yarns only in the vertical plane between deflection **65** and first feed system **18**.

Referring to Figures 4 and 5, 7 and 8, the creels, processing frames and takeup frames **3** are arranged such, and the yarn advances such that it is guided from deflection **66** on creel **1** of, for example, the left-hand machine half, not to the feed system of the same machine half, but through mirror plane **9**, to feed system **18** of the other, right-hand machine half, and that it is then treated, false twist crimped, and wound in the frame portions, such as takeup frame **3**/processing frame **2**, of the other, right-hand machine half. Likewise to this end, each yarn is guided in its own tube. In creel **1**, the tubes of several yarns are combined to a bundle **26**. Each tube is airtight, so as to permit to suck off and suck in each yarn by means of a suction gun, which is held against the tubular passageway in the region of first feed system **18**. This tubular passageway has the advantage that it does not obstruct the operation of heater **20** and cooling plate **24** and the threading of the yarn. On the other hand, it is easy to operate the tube or tubes as a result of being able to suck in the yarns. The tubes **26** possess the gentlest possible bends, so as to permit the yarn to advance without being damaged, and so as to prevent air from accumulating.

Referring in particular to the embodiment of Figure 4, its characteristic consists in that the yarns advancing from the left-hand machine half are processed in the right-hand machine half, or vice versa. This allows to simplify the entry into first feed system **18**, and to reduce the sum of the deflection angles upstream of first feed system **18**.

The bundle of tubes proceeding from the creel extends above the creel and above heater **20** or cooling plate **24** as a result of deflection device **66** in a horizontal plane **63** in direction toward mirror plane **9**. At deflection **65**, the tubes are directed downward. The deflection **65** may be located anywhere along a horizontal line in that space, which extends above heater **20** of the left-hand machine half and first feed system **18** of the right-hand machine half. Preferably, the deflection **65** is located on the side of mirror plane **9**, on which also creel **1** is arranged, from which the tubular passageway originates. No later than between deflection **65** and first feed systems **18** of the right-hand machine half is the bundle of tubes **26** fanned out such that one tube terminates in front of each feed zone of feed shaft **18.1**. This applies likewise to the yarns advancing from the creel arranged on the right side of mirror plane **9**.

Referring to Figures 5 and 7, the embodiments shown therein employ, for example, a particularly high creel **1**. Directly downstream of their feed packages, each yarns is pulled into a tube. Figure 5 shows the tubes, which proceed from the feed yarn packages creeled in the lower portion of the creel and extend upward. The tubes which proceed from the feed yarn packages creeled in the upper portion of the creel, extend downward. All tubes are combined to a bundle and extend then along a horizontal (Figure 5) or an inclined (Figure 7) guide plane **63**. This plane **63** lies above the head of the operating personnel and in such a manner that the feed systems and treatment devices of the texturing zones are the least possible affected. In the embodiment of Figure 7, the planes **63** of the two machine halves are oppositely inclined. Figure 6 is a top view of these planes **63** related in particular to Figures 5 and 7. More specifically, the tubes extend in bundles in direction toward the respective other machine half. Shortly before or behind mirror plane **9**, the bundle of tubes is fanned out, so that each tube terminates in front of one feed zone of feed shaft **18.1**. It is important that the tubes are not fanned out in front of feed system **18** of that machine half, from which the bundle of tubes **26** originates. Again, it is emphasized that the yarns advancing from the creel arranged on the right side of mirror plane **9**, are guided through mirror plane **9** to feed system **18** of the left-hand machine half, and treated, false twist crimped and wound therein. The same applies to the yarns advancing from the

creel arranged on the left side of the mirror plane. It should be remarked, that tubular passageway **26** of the yarns advancing from the left in Figure 5 is discontinued for reasons of a better illustration. It may be useful to have planes **63** of the group of yarns advancing from the right side and of that advancing from the left side extend at different heights, or, as shown in Figure 7, to have the planes **63** oppositely incline, so that the yarns have a downward directed component. This allows to make it geometrically easier to fan out the guide tubes.

Referring now to Figure 6, the bundle **26** of guide tubes combined in creel frame **1** extends downward to a plane of the machine, which extends below platform **56**. There, the bundle is deflected to a horizontal direction. Then, the bundle passes below the platform. Behind the platform, the bundle is fanned out to proceed to the other machine half. There, the tubes pass below platform **56** of the other machine half. Below the takeup frame of the other machine half, the tubes are deflected upward and proceed upward in a vertically directed plane. Finally, each tube terminates in front of one of feed systems **18**.

Figure 6 applies in particular to Figures 5 and 7. However, the embodiment may also be transferred to Figures 4 and 8, and is therefore described again in more detail.

Illustrated in Figure 6 is the described tubular passageway in a top view of the machine, there being shown only a section of the overall length of the machine. To be able to clearly illustrate the tubular passageway, essential parts of the processing frame and takeup frame have been omitted. Shown are creel frames **1** which are circular. Arranged on each horizontal plane are four packages. Several of such planes overlie one another, as has been shown in the other embodiments. Each yarn is pulled into a vertically upward or vertically downward extending tube. The tubes proceeding from the creel are combined to a bundle **26**. From creel frame **1**, the bundle of tubes extends in a horizontal (Figure 5) or in a downward inclined guide plane **63**. At first, the bundle of tubes **26** traverses processing frame **2**, then operator aisle **4**, and thereafter takeup frame **3** of that machine half, from which it originates. Approximately above (Figures 5 and 7) or below (Figure 8) takeup frame **3**, the bundle **26** of tubes is fanned out in plane **63**. In this fanned-out formation, each guide tube extends such that it terminates in front of one of feed systems **18** in takeup frame **3** of respectively the other machine half. In front of this feed system **18**, which is the first feed system for the entire texturing process, it is possible to also arrange a yarn cutter **67**. As shown in Figure 6, the guide tubes of the one machine half intersect the guide tubes of

the other machine half in their fanned-out configuration. This is easily possible, when the tubes -- as in Figure 7 -- extend along inclined guide planes **63**. When, as shown in Figures 5 and 8, the tubes extend horizontally, they are laid in parallel planes **63**, which can closely adjoin one another. The path, along which the yarn continues to be advanced, is not shown in Figure 6, since therein the machine components arranged above plane **63** have been omitted for a better illustration. It should here be mentioned that Figure 6 may likewise be read on the arrangement of Figure 4 with the one difference that, in this instance, the bundle of tubes **26** extends at first substantially horizontally to deflection **65**. From this deflection **65**, the bundle of tubes is fanned out, with the plane of the fanned-out configuration being inclined downward. Conversely, in the embodiment of Figure 8, the bundle proceeds initially from the creel in horizontal direction, and may be fanned out already along this horizontal path. Thereafter, it is necessary to have the tubes proceeding from the one machine half extend in a different plane than the tubes proceeding from the other machine half. This is avoided, when the bundle of tubes is fanned out only after having been deflected to the vertical plane.

NOMENCLATURE

30	1	Creel frame
	2	Processing frame
	3	Takeup frame
	4	Operator aisle
	5	Service aisle
35	6	Package storage
	7	Takeup device
	8	Tube feed device
	9	Mirror plane
	10	Feed yarn package
40	12	Yarn
	14	Yarn guide
	16	Deflection roll
	18	Feed system
	20	Heater
45	22	Deflection roll
	24	Cooling plate
	26	Tubular passageway, bundle of tubes
	28	False twist unit
	30	Feed system
50	32	Heating jacket
	34	Heating tube
	36	Source of compressed air
	37	Valve
	38	Duct
55	40	Tube
	42	Equalizing tube
	44	Yarn guide
	46	Feed system

47 Mouthpiece
 48 Opening
 50 Takeup package
 52 Friction roll
 54 Yarn traversing mechanism
 56 Platform
 58 Post, rail
 60 Floor
 62 Suction gun
 63 Plane of tubular passageway
 64 Deflection roll
 65 Deflection point
 66 Deflection point
 67 Yarn cutter

Claims

1. False twist crimping machine for false twist crimping a plurality of thermoplastic yarns, each in one processing station, which comprises a feed yarn package (10), a first feed system (18), an elongate first heater (20), an elongate cooling plate (24), a false twist unit (28), a second feed system (30), as well as a takeup device (7), the false twist machine being composed of several frame parts, and a creel frame (1) being associated with the false twist machine,
characterized in that
 the frame parts comprise a processing frame (2) provided in the direct vicinity of creel (1) and a takeup frame (3) facing away from the creel;
 that between the processing frame (2) and the takeup frame (3), an operator aisle (4) is formed;
 that the first feed system (18) and the first heater (20) are supported on the takeup frame (3);
 that the cooling plate (24), the false twist unit (28), and the second feed system (30) are supported on the processing frame (2); and
 that the takeup devices (7) for a plurality of processing stations are arranged in columns on top of one another and can be serviced both from operator aisle (4) and from the side facing away therefrom (service aisle 5).
2. Machine as in claim 1,
characterized in that
 downstream of the second feed system (30), each processing station comprises a set heater (34) and a third feed system, and that also the set heater (34) is supported on the processing frame (2).
3. Machine as in claim 2,
characterized in that

also the third feed system (46) is arranged in the takeup frame (3) below the takeup devices.

4. Machine as in one of claims 1-3,
characterized in that
 a tube feed device (8) is associated to each takeup device, and arranged in the takeup frame (3), preferably on the side facing away from the operator aisle (4).
5. Machine as in one of the foregoing claims,
characterized in that
 the yarn advances from the creel (1) through the vertical planes defining the processing frame, i.e., across the processing frame or below the processing frame or through the processing frame directly to the first feed system (18).
6. Machine as in claim 5,
characterized in that
 each yarn advances, preferably from its feed package, through its own tubular passageway to the first feed system (18).
7. Machine as in claim 6,
characterized in that
 the tubular passageway (26) extends above the first heater (20) and cooling plate (24).
8. Machine as in one of the foregoing claims,
characterized in that
 the machine is constructed as a double machine, in that the creel (1), the processing frame (2), as well as the takeup frame (3) are arranged in mirror symmetry to a plane (9), the mirror plane (9) extending vertically and parallel to the takeup frame and at a distance from the front side of the takeup frame (3) facing away from the operator aisle (4) such that a service aisle (5) forms between opposite takeup frames (3) of the two machine halves.
9. Machine as in claim 8,
characterized in that
 each yarn, whose feed package is arranged on the creel (1) of the one machine half, advances through its own tubular passageway substantially in vertical direction through the mirror plane (9) to the first feed system (18) of the other machine half and is there false twist crimped.
10. Machine as in claim 9,
characterized in that
 the tubes are combined to groups, and extend from the creel initially as a bundle (26) in direction of the other machine half, and before

reaching the first feed system (18), they are fanned out in a common plane such that one tube terminates in each processing station of the other machine half.

facing away from the operator aisle (4).

- 5
11. Machine as in claim 9 or 10,
characterized in that
the bundle of tubes (26) extends above the
first heater (20) and cooling plate (24) of the
one machine half. 10
12. Machine as in claim 11,
characterized in that
the bundle of tubes is fanned out in the region
between the processing frame of the one machine half and the first feed system of the 15
other machine half in a downward inclined plane.
13. Machine as in claim 9 or 10, 20
characterized in that
the bundle of tubes extends through the processing frame (2) and the operator aisle (4) of the machine half, from which it originates, substantially above head height, and is then 25
fanned out behind the first feed system in a guide plane (63).
14. Machine as in claim 13,
characterized in that 30
the guide planes (63) of the two machine halves extend substantially horizontally and parallel to one another.
15. Machine as in claim 13, 35
characterized in that
the guide planes (63) of the two machine halves are oppositely and downwardly inclined in the direction of the advancing yarn. 40
16. Machine as in claim 9 or 10,
characterized in that
the bundles of tubes extend below the machine half from which they originate to the 45
other machine half.
17. Machine as in claim 16,
characterized in that
the bundles of tubes are deflected in the
takeup device of the other machine half to a 50
substantially vertical guide plane and fanned out in this plane.
18. Machine as in one of the foregoing claims,
characterized in that 55
a package storage for at least one full package is associated to each takeup device, which can be serviced from the side (service aisle 5)

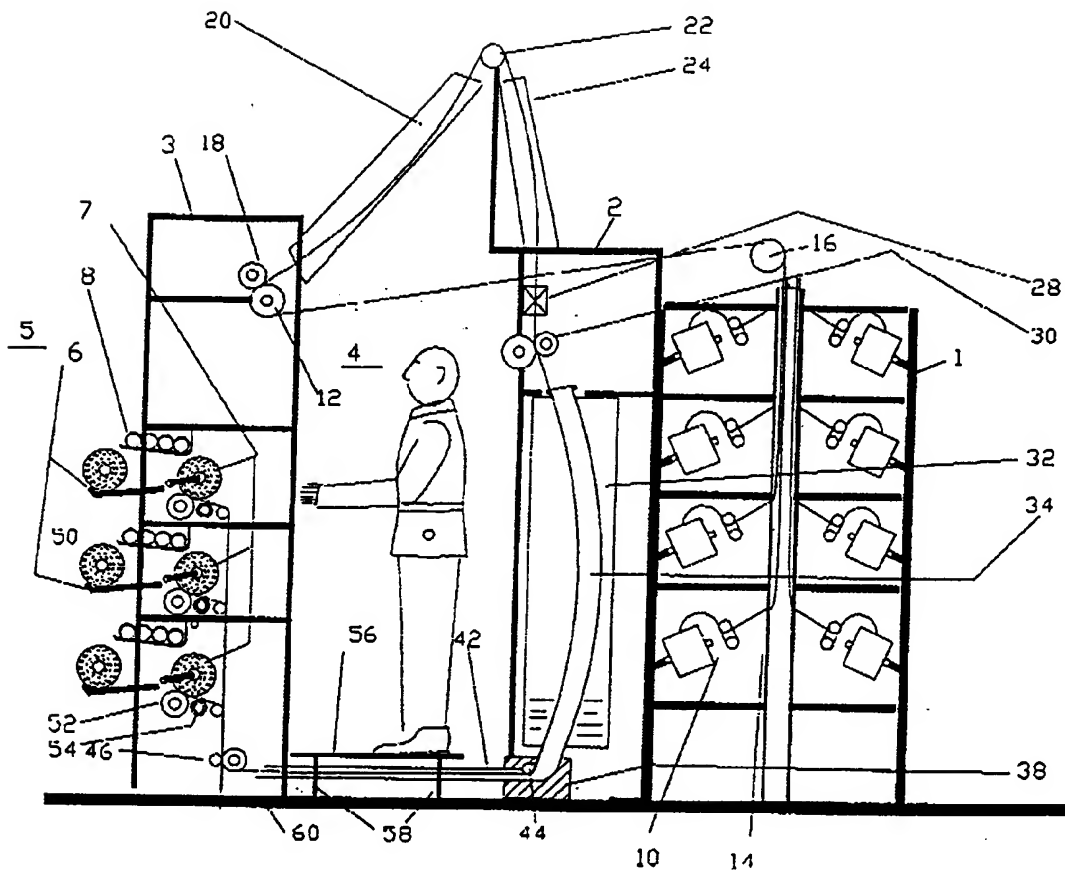


Fig. 1

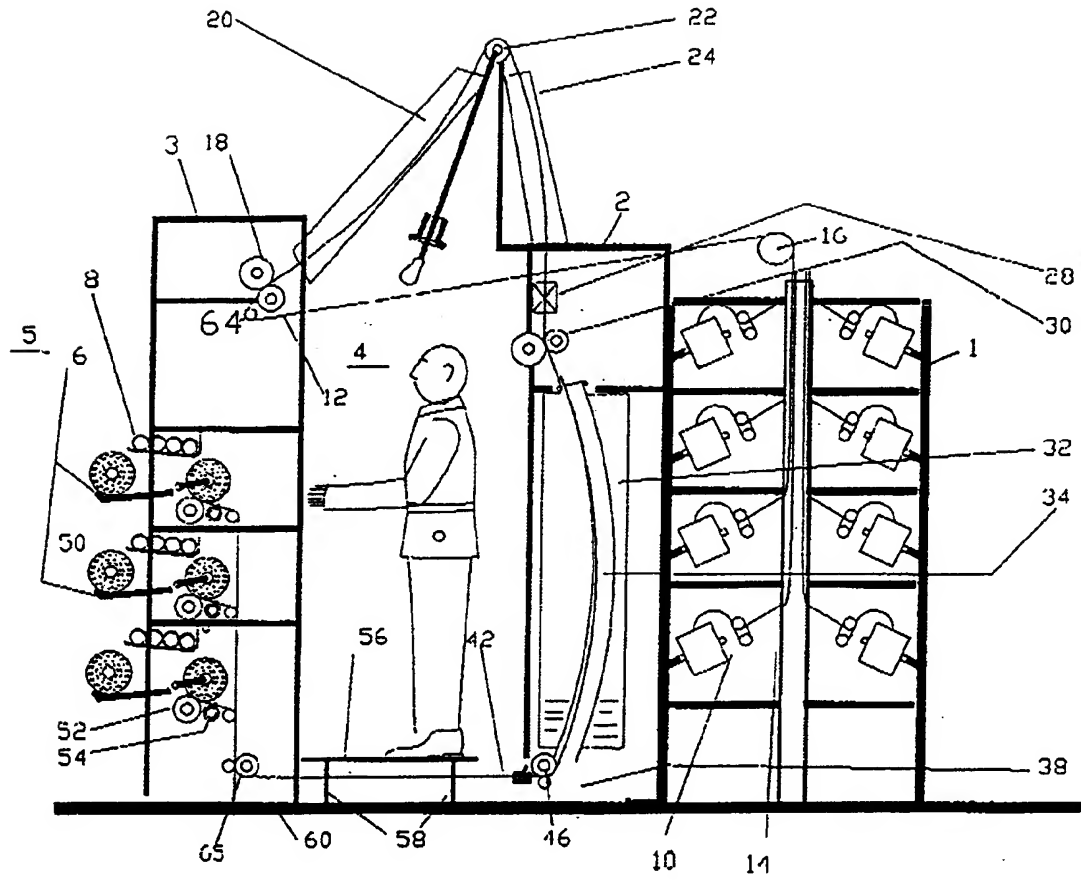


Fig. 1 A

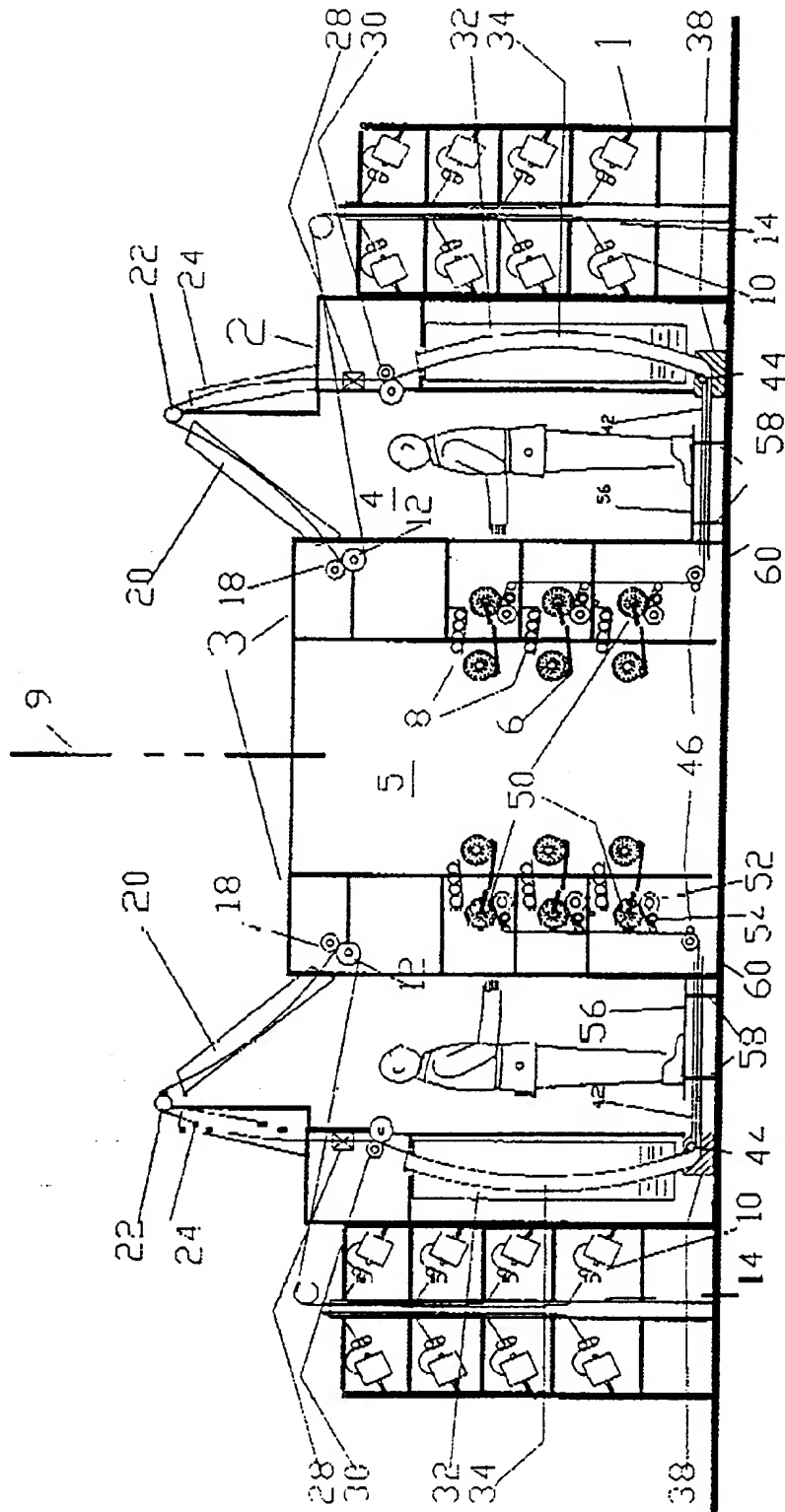


FIG. 2

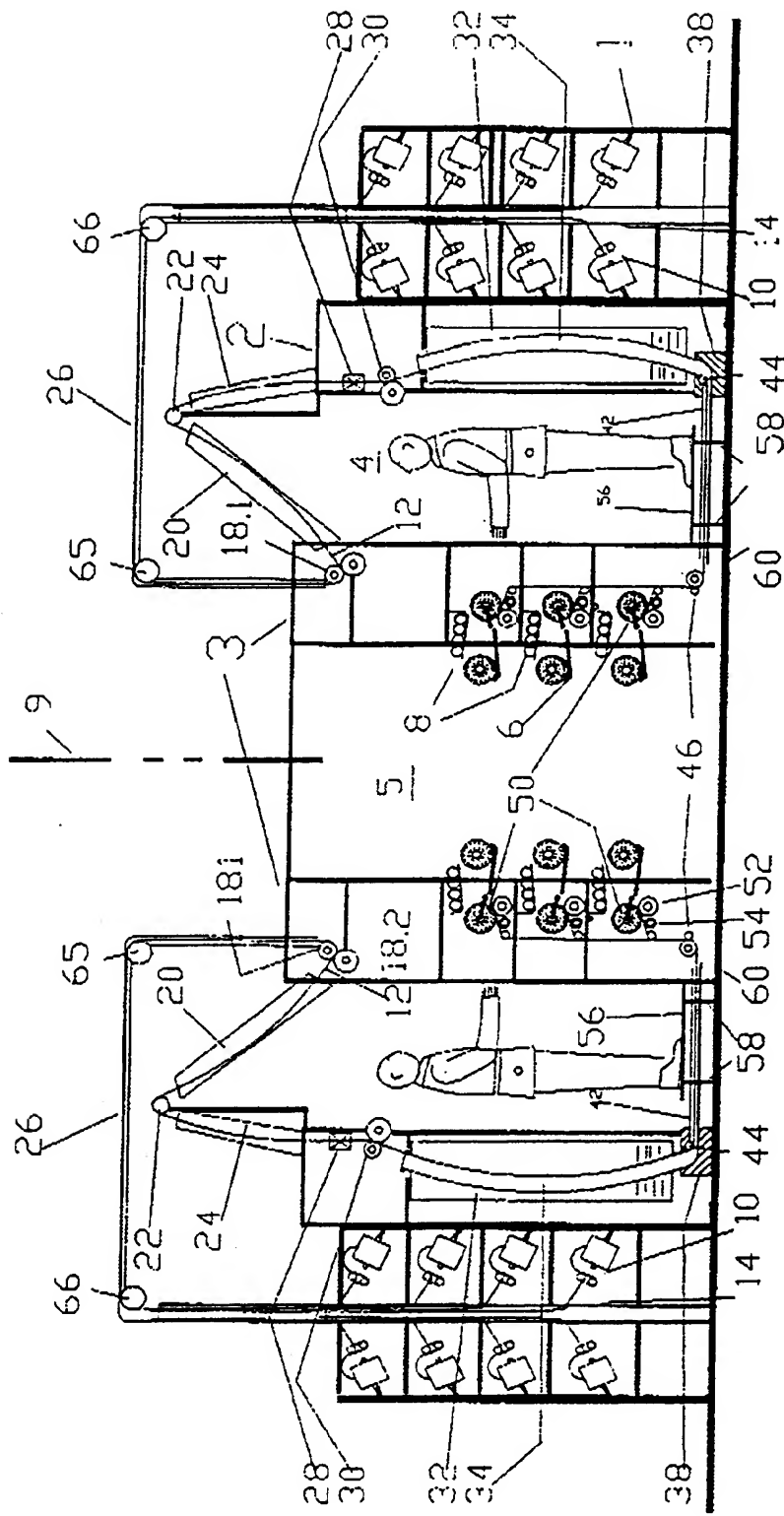


FIG. 3

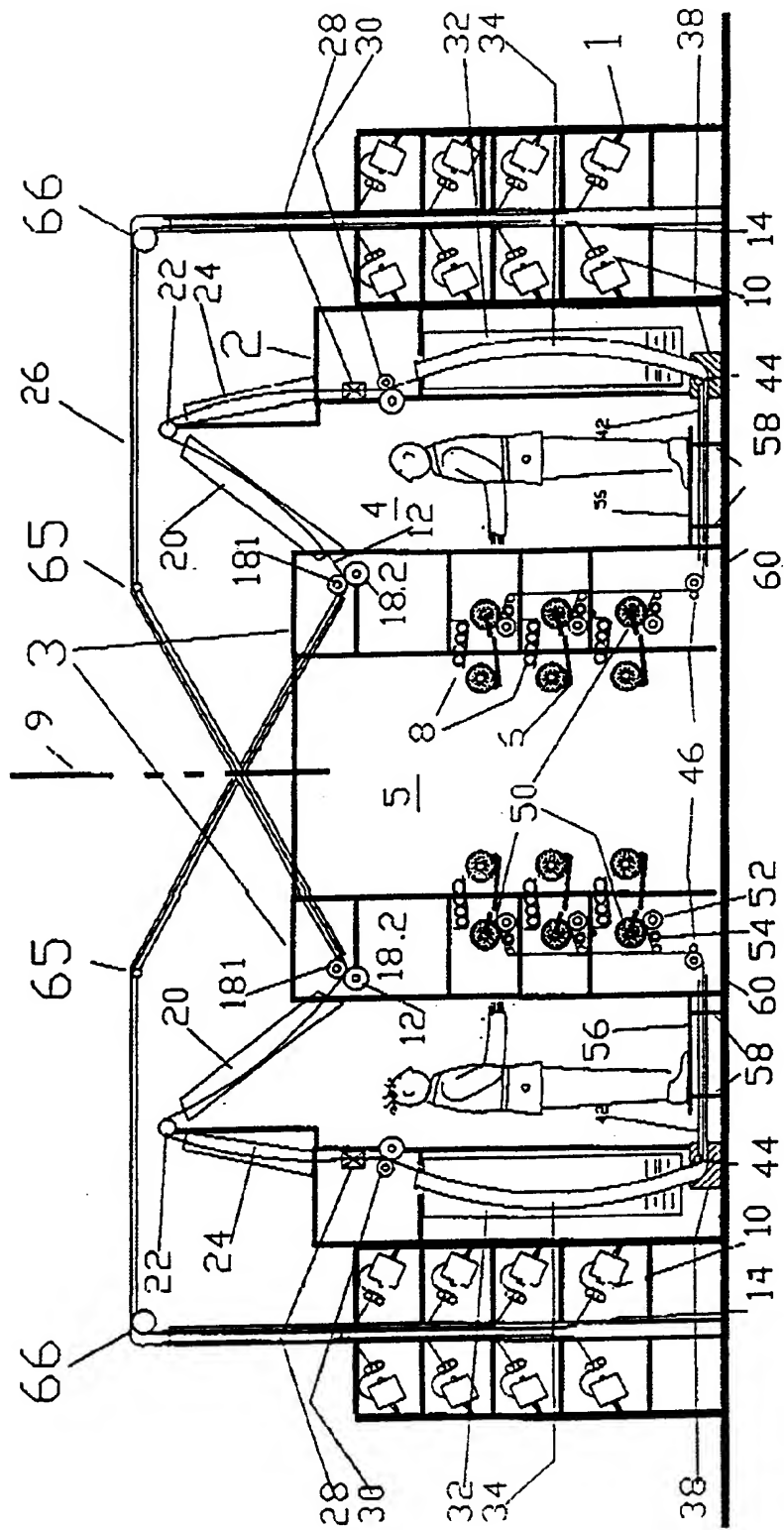


FIG. 4

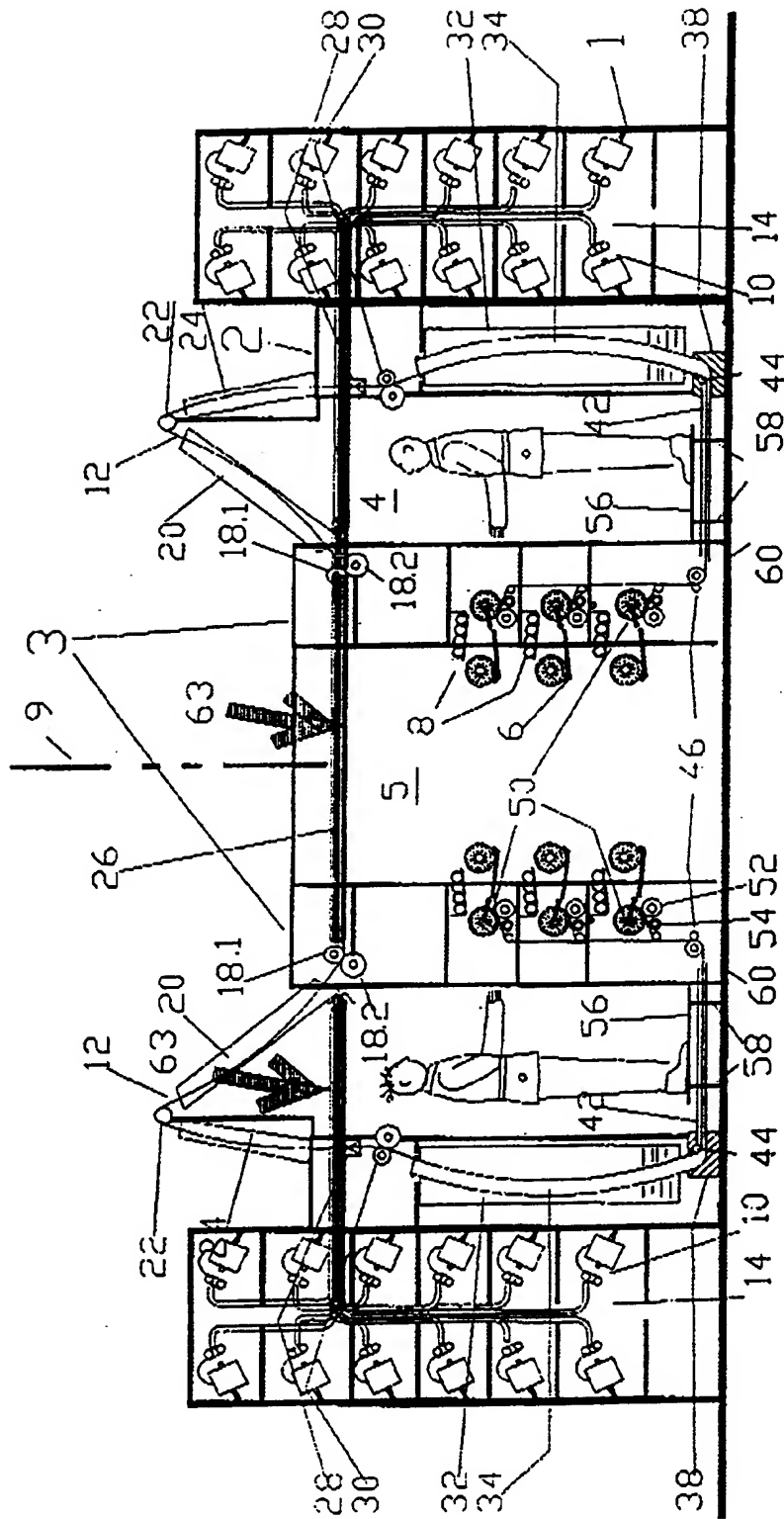


FIG. 5

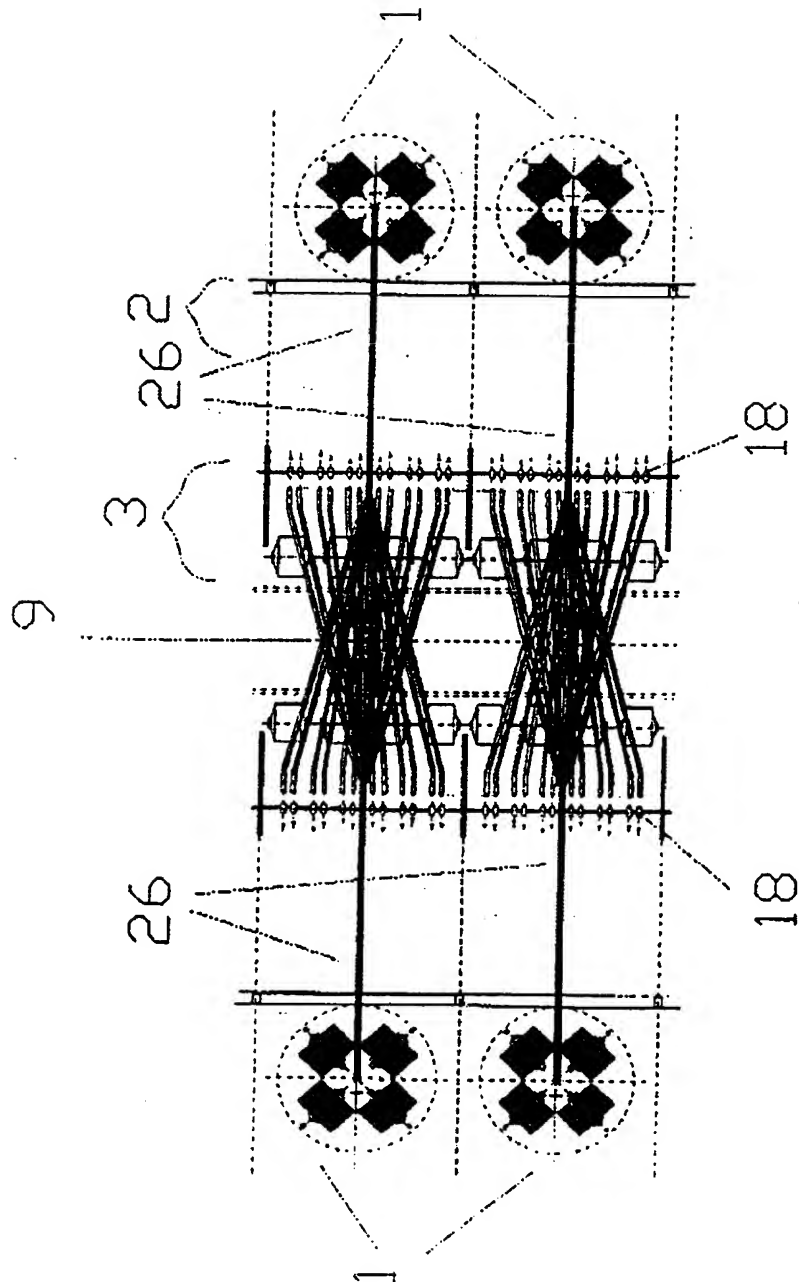


Fig. 6

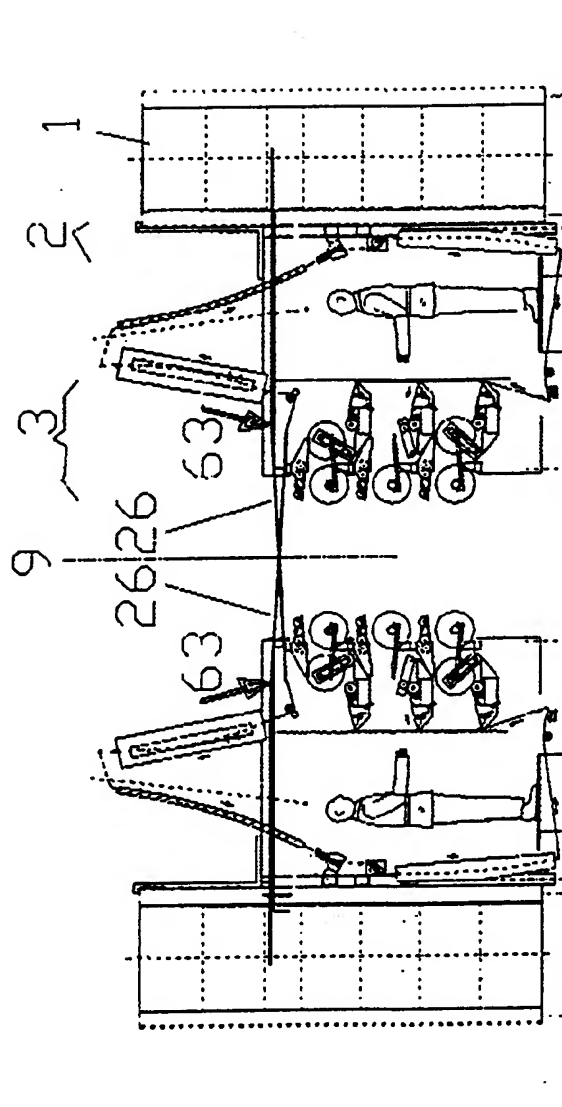


Fig. 7

